Living Systematic Reviews: Principles and progress

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6ᵗʰ International Inititative for Traumatic Brain Injury Research (InTBIR) Meeting,
October 30-31 2017, **Washington DC**

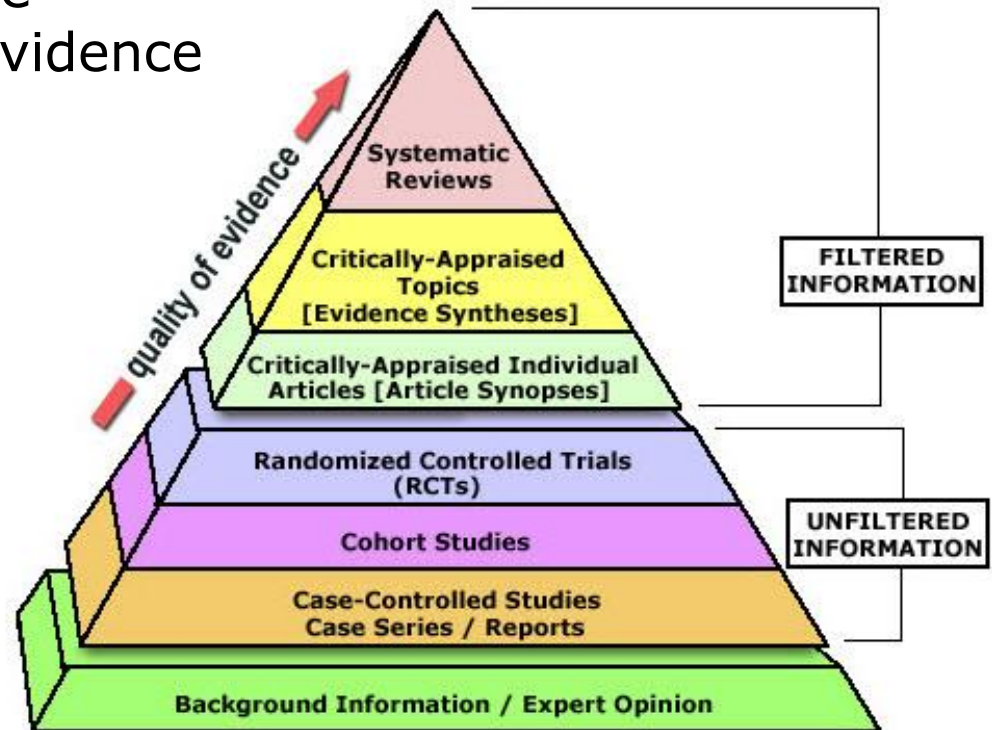UNIVERSITÉ LAVAL

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Disclosures

Why knowledge synthesis is important?

Evidence based practice
research: Pyramid of evidence

Why conducting knowledge synthesis research?

- Provide the best evidence currently available

- Helpful for clinical decision-making context
 - **Guidelines development**

What is a systematic review?

"A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question.

It uses explicit, systematic methods that are selected with a view to minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made."

Oxman 1993

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What is the current ecosystem for conducting systematic reviews?
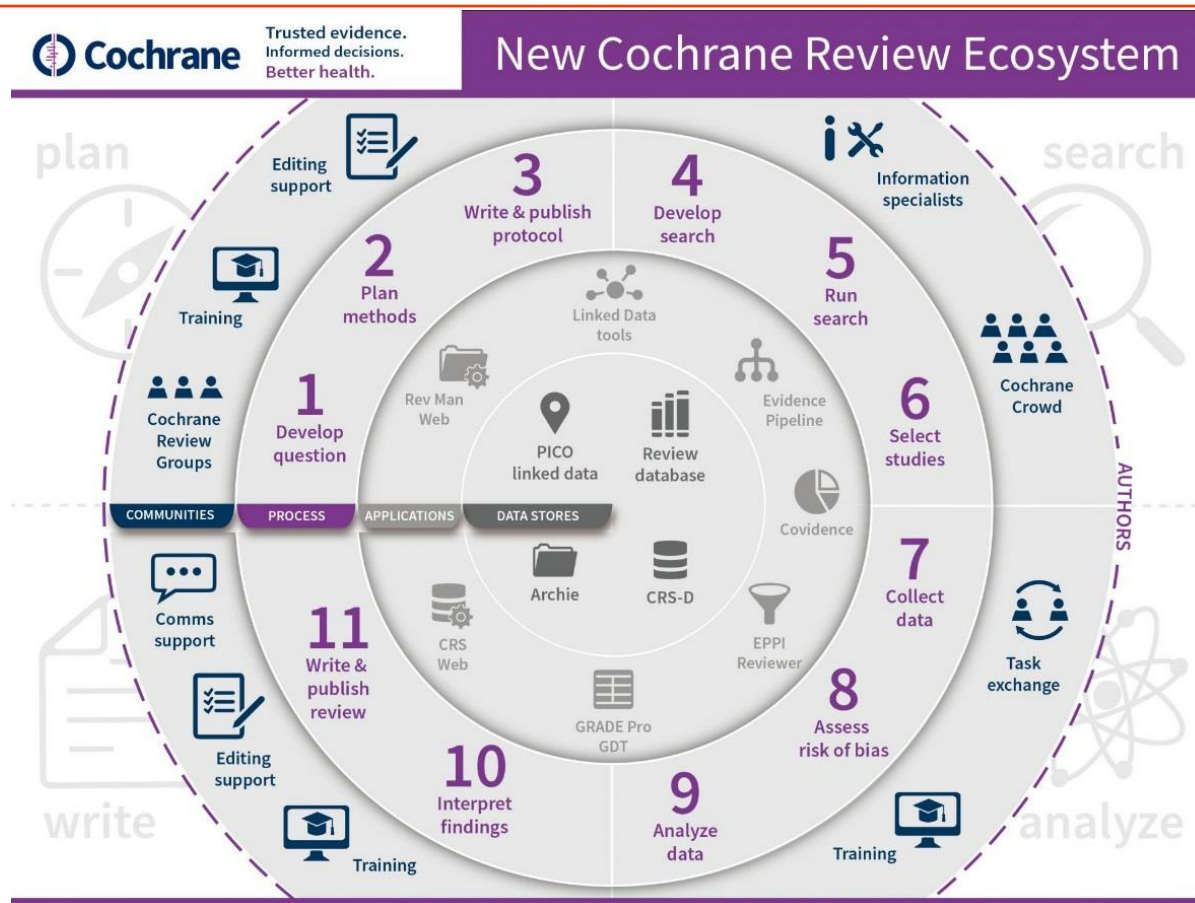
What is a living systematic review (LSR)?

"A systematic review that is continually updated, incorporating relevant new evidence as it becomes available"

Elliott et al. *Journal of Clinical Epidemiology 2017*

How LSR differ from other types of reviews?

	Living systematic reviews	Frequently updated systematic reviews	Rapid reviews	Standard systematic reviews
Explicit methods for "when" and "how" of updating	Yes	No	No	No
Continuous surveillance in the databases for new articles	Yes	?	No	No
New evidence rapidly incorporated and published	Yes	No	No	No
Using standard methodologies of systematic review	Yes	Yes	No	Yes

Cochrane Canada Symposium
LSR Workshop - May 2017

- LSR network created – joined Australian/Canadian initiative

- Development of methods guidelines

What is the process for conducting a LSR?
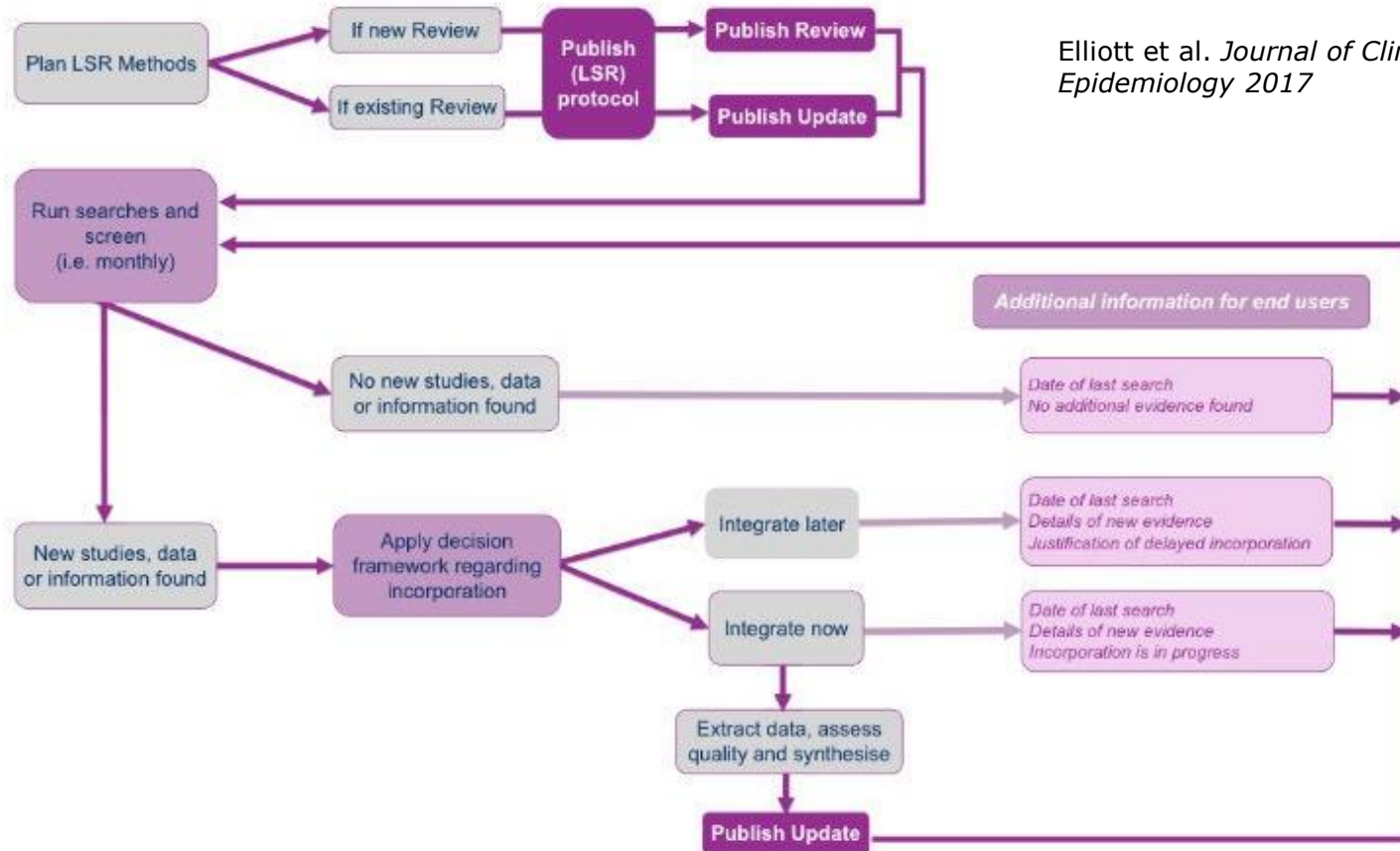
Elliott et al. *Journal of Clinical Epidemiology 2017*

When should we perform a LSR?

- **A LSR is not always appropriate**

- Should be initiated when:
    - High priority for decision-making
    - Uncertainty in the existing evidence
    - New research evidences are about to emerge in this field

How to perform a LSR?

- Uses the standard methods for conducting SR
- Should be describe explicitly in the protocol
- If changes occur in the methodology, should be stated in the LSR and in an accessible review protocol
- Ongoing or frequent searches (monthly) in the databases using auto alerts or manual search
- Updating analyses, findings and conclusions

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How to perform a LSR?

- If new studies are found: integrate now or later (negligible effects on the evidence)
- Peer review of the protocol and initial LSR

- Should use a publication format that can be easily updated

What are the most developed format so far?

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About MAGIC

MAGIC is a research and innovation programme and non-profit initiative within the health sector, working to improve the creation, dissemination and dynamic updating of clinical practice guidelines, evidence summaries and decision aids.

Learn more

Our approach

MAGIC has been realised using the GRADE methodology and through international collaboration, combined with the latest web technology, intuitive design and emphasis on open and linked digitally structured data.

Learn more

WikiRecs* and BMJ RapidRecs

Trustworthy recommendations

Rapid creation and dissemination of trustworthy recommendations to the point of care: Collaborative network approach

* Wiki (means rapid in Indonese) Recommendations and evidence summaries

What are the main issues with conducting LSR?

- LSR is an ongoing process that take time and resources
- Time consuming and human resources intensive
  - Ongoing or frequent searches in the databases for new articles to keep the systematic review up-to-date
  - On a regular basis:
    - Performing new analyses
    - Updating results and conclusions
    - Updating meta-analysis

How to make it feasible?

- Opportunities for automation and machine learning technologies

- Separate tasks into microtasks as well as using technological tools can help make the process more efficient

- Machine automation can help with running searches in the different databases, eligibility assessment, data extraction, assessment of risk of bias and synthesis

Thomas et al. *Journal of Clinical Epidemiology 2017*

LSR in TBI initiative within InTBIR

- Collaborative efforts

  - CENTER TBI
  - Canada Research Chair in Critical Care Neurology and Trauma
  - CIHR Foundation Scheme grant

  - Cochrane Australia
  - Cochrane Canada
  - LSR methods groups in Australia and Canada

LSR in TBI initiative within InTBIR

- Collaborative efforts

  - Identification of questions of interests with clinical equipoise

  - LSR team and Living guidelines team

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Living systematic review - Resources

When and how long should we be updating meta-analyses?

- Frequent updates are needed in order to provide the best available evidence
- Just like the LSR, meta-analyses included in these reviews need to be updated frequently
- When to stop? If too early, there's a risk of error
- Results may change when new studies are published

Updating meta-analyses

- Two reasons to perform a LSR:
  - Provide the best evidence currently available
  - Helpful for clinical decision-making context

Simmonds et al. (2017). Living systematic reviews: 3. Statistical methods for updating meta-analyses. *Journal of Clinical Epidemiology*

Living systematic reviews on the Cochrane Library

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Basic characteristics of a SR

- Clearly stated set of objectives
- Pre-defined eligibility criteria
- Explicit & replicable methodology
- Systematic search (scientific & grey literature, reference lists of included studies, etc.)
- Assessment of the validity of the findings (risk of bias, GRADE, etc.)
- Systematic presentation & synthesis of the characteristics and findings

How to perform a living systematic review?

- Before updating a LSR, questions to ask:
  - Does the published review still address a current question?
  - Review used valid methods & was well conducted?
  - Are there any new relevant methods?
  - Are the any new studies, or new information?
  - Will the adoption of new methods change the findings or credibility?
  - Will the new studies/information/data change the findings or credibility?

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www.robotreviewer.net

Human & Machine technologies

Machine technologies are helpful…

- Synthesis and reporting
  - Generating sections of an article by using a template predefined (i.e., RevMan)

Thomas et al. (2017). Living systematic reviews: 2. Combining human and machine effort. *Journal of Clinical Epidemiology*

Updating meta-analyses

- If the purpose of the LSR is to provide the best evidence available → standard meta-analysis methods

- If the purpose of the LSR is to help make decisions → used approaches to avoid type I and II errors

Simmonds et al. (2017). Living systematic reviews: 3. Statistical methods for updating meta-analyses. *Journal of Clinical Epidemiology*

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Updating meta-analyses

- Four methods used to avoid statistical problems:
    - Type I error:
        - Law of the iterated logarithm
        - Shuster method
    - Type I & II errors
        - Trial sequential analysis
        - Sequential meta-analysis

Simmonds et al. (2017). Living systematic reviews: 3. Statistical methods for updating meta-analyses. *Journal of Clinical Epidemiology*

Updating meta-analyses

Key properties of the updating methods

	Trial sequential analysis	Sequential meta-analysis	Shuster	Law of the iterated logarithm
Corrects for type I error	Yes	Yes	Yes	Ye
Corrects for type II error	Yes	Yes	No	No
Assumed effect size and statistical power required	Yes	Yes	No	No
Need to specify number of updates	No	No	Yes	No
Adjusts information/sample size for heterogeneity	Yes	Yes	No	No
Adjusts for misestimation of heterogeneity	No	Optional	No	No

Simmonds et al. (2017). Living systematic reviews: 3. Statistical methods for updating meta-analyses. *Journal of Clinical Epidemiology*

Publication of a living systematic review - Issues

- Do we need to update the entire article or just a few sections?
- How can we inform readers with the update?
  - Using CrossMark?
  - Indicate the version in the digital object identifier (DOI) (i.e., .pub3)?
  - Put an explicit link in the database (i.e., Update or: Cochrane Database Syst Rev. 2005;(2):CD005283)?
  - A "what's new" section?

MacLehose (2016). Solving the Cochrane LSR publishing puzzle. Available from: http://methods.cochrane.org/sites/default/files/public/uploads/news/6._maclehose_lsr-publishing-puzzle.pdf